

the rectangle is more pleasing than the square because of its variety. For example, the Coccinellidæ are not as pleasing as to form as the Elateridæ. Symmetry at times becomes monotonous. Some members of this order are exploited horizontally from the vertical line formed by the inner edges of the wing covers and others, vertically above and below the upper edge of the abdomen or markings on the abdomen, while still others will impress one at the first only with their pleasing or displeasing inequality of parts.

Some of the Odonata also exhibit a pleasing inequality of parts, especially those which are T-shaped when spread.

Aesthetic pleasure depends in part upon certain habitual methods of orientation and exploitation, such as the movement of the eyes and attention upwards which is preferred to a movement downwards, a movement from the eyes of left to right, which is preferred to the opposite movement, and proportion, which is more pleasing in some cases than symmetry. As mentioned before, symmetry and proportion are only two of the many factors contributing to the total result known as æsthetic appreciation of insects.

THE CADDIS-FLIES (TRICHOPTERA) OF JAPAN.—II.

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(Continued from Vol. XLV, p. 327.)

Family Limnophilidæ.

Of this family I recognize six genera as occurring in Japan, viz., *Glyphotælius*, *Nemotaulius*, *Grammotaulius*, *Limnophilus*, *Nothopsyche*, and *Moropsyche*.

Genus *Glyphotælius* Steph.

1. *Glyphotælius admorsus* MacLachlan.

Glyphotælius admorsus MacLachlan—Trans. Ent. Soc. Lond. (3) V, p. 250 (1866); Hagen, Verh. zool.-bot. Ges. Wien, XXIII, p. 446 (1873); Matsumura, Thous. Ins. Jap., I, p. 167, pl. XII, fig. 4, ♂ (1904); Ulmer, Cat. Coll. Selys, VI, p. 16, figs. 24 and 25, pl. I, fig. 4 (1907); Ulmer, Deutch. Ent. Zeit., p. 340 (1908).

Habitat—Hondo (Gifu, Okayama, Tokyo, Inokashira, near Tokyo, Osaka, Teganuma, etc.); Kiushin (Yanagawa, Prov. Chikugo).

March, 1915

Time of appearance—April to June.

2. *Glyphotælius miyakei*, sp. nov.

Head lurid reddish brown, covered with minute whitish hairs; vertex blackish; narrowly yellowish around eye; palpi fuscous. Antenna fuscous, some terminal joints suffused with yellow. Eye shiny black.

Pronotum covered with whitish hairs, divided in the middle by a longitudinal line. Mesothorax fuscous. Metathorax somewhat yellowish.

Legs yellowish, tibia II and tarsi of all legs more or less suffused with fuscous; spines black or fuscous black; spurs yellow.

Fore-wing tinged with brownish yellow, rather strongly produced at apex and sinuated at apical margin; apical half of the wing slightly clouded with greyish; hyaline oblique band in the discal area of the wing entirely wanting; a few black stripes and dots along cubital and anal veins; pterostigma quite indistinct; hind marginal area of the wing not marked with special colour.

Hind-wing hyaline, colourless, excepting the apical area and pterostigma, which are slightly tinged with yellowish; venation yellowish.

Abdomen dark brown above, somewhat paler on ventral side. In the male the 9th abdominal segment is produced at its posterior margin into a triangular portion, the edge of which is directed downwards and beset with few soft hairs; superior appendage small, piceous, and subquadrate; inferior appendage very large, not parted in the middle by an impressed line; penis very long, suddenly dilated a little before its apex, with a hairy accessory process on each side.

Length of body 13 mm.; fore-wing 20 mm.; hind-wing 16 mm.

Type—A single male obtained at Matsuyama, Prov. Iyo, Shikoku, in my collection.

This species is respectfully dedicated to Dr. T. Miyake, at whose suggestion and through whose kindness I was able to take up the study of Japanese caddis-flies.

This species is very closely allied to *G. admorsus*, but can be distinguished by the markings of the fore-wing and the structure of the male genitalia.

Genus *Nemotaulius* Banks.3. *Nemotaulius brevilinea* (MacLachlan).

Grammotaulius brevilinea MacLachlan, Journ. Linn. Soc. Lond., Zool., XI, p. 107, pl. II, fig. 1, ♀ (1871); Hagen, Verh. zool.-bot. Ges. Wien., XXIII, p. 453 (1873); MacLachlan, Rev. Syn. Trichopt. Europ. Fauna, p. 34 (1894); Matsumura, Thous, Ins. Jap., I, p. 169, pl. XII, fig. 7, ♀ (1904).

Nemotaulius brevilinea Banks, Proc. Entom. Soc. Wash., VII, p. 107 (1906); Ulmer, Genera Insectorum, Trichoptera, p. 40 (1907); Ulmer, Deutch, Ent. Zeit., p. 341 (1908).

Glyphotælius subsinuatus Ulmer, Notes Lyden Mus., XXVIII, p. 5, figs. 5, 6, ♂ (1906); Ulmer, Gen. Ins., Trichopt., p. 40 (1907); Ulmer, Deutch. Ent. Zeit., p. 341 (1908).

MacLachlan's original description of this species is sufficiently precise, except in that his types were females. There is no doubt in my mind that the form described by Ulmer under the name of *Glyphotælius subsinuatus* is the male of this species.

Habitat—Hondo (Gifu, Kangawa, Yokohama, Tsuchiura, Teganuma, Kyoto, etc.); Hokkaido (Sapporo); Shikoku (Matsuyama).

Possibly of general distribution in Japan.

Time of appearance—April to June.

Genus *Grammotaulius* Kolenati.4. *Grammotaulius ornatus*, sp. nov.

Head reddish brown, covered with hairs of pale yellow; a rather deeply impressed longitudinal line on vertex; narrowly pale yellow around eye; maxillary and labial palpi fulvous brown, apical joint of the latter blackish; antenna yellowish, with rather indistinct brownish annulations.

Prothorax reddish brown with a median impressed line above; covered with minute pale yellow hairs; beset with long fuscous hairs on both sides. Mesothorax fuscous black; median part of notum reddish brown, furnished with minute tubercles and hairs; tegulæ brown, beset with long blackish hairs. Metathorax entirely dark brown. Legs yellowish; spurs and spines fuscous black.

Fore-wing semi-hyaline, slightly tinged with brownish yellow; an oblique broad hyaline band in discal area, both sides of the

band marked with large fuscous spots, several small fuscous spots in the area between radius and its sector; a large hyaline mark, with a few fuscous spots in, at the outside of discal cell; apical marginal area rather irregularly marked with fuscous.

Hind-wing hyaline and nearly colourless, slightly tinged with yellowish at apex.

Abdomen fuscous black, hind margin of most segments somewhat paler. Female with two slender, hairy processes at the apex of the abdomen.

Male unknown.

Length of body 13 mm.; fore-wing 16 mm.; hind-wing 14 mm.

The type is a single female in my collection. It was captured by Mr. Arakawa at Uwajima, Prov. Iyo, Shikoku, in May, 1913.

Genus *Limnophilus* Leach.

5. *Limnophilus correptus* MacLachlan.

Limnophilus correptus MacLachlan, Rev. Syn. Trichopt. Eur. Fauna. Suppl. II, p. 18, pl. LIII, fig. 3 (1880); MacLachlan, First add. Suppl., p. 5 (1884); Matsumura, Thous. Ins. Jap., I, p. 171, pl. XII, fig. 10, ♀ (1904); Ulmer, Deutch. Ent. Zeit., p. 341 (1908).

Limnophilus borealis Ulmer, Cat. Coll. Zool. Selys, VI (1), p. 17, figs. 26, 27 (1907), nec Zetterstedt.

(?) *Limnophilus borealis* Ulmer, Deutch. Ent. Zeit., p. 341 (1908). The Japanese form recorded by Ulmer as *L. borealis* can not be that species. He could not have examined a specimen in good condition, or he would never have considered the form identical with *borealis*, from which it is in reality quite distinct.

The wing-markings of this species vary to a remarkable extent.

Habitat—Hokkaido (Sapporo, Hokodate); Shikoku (Uwajima, prov. Iyo). Outside of Japan—China, Amurland.

Time of appearance—Unknown.

6. *Limnophilus fuscovittatus* Matsumura.

Limnophilus fuscovittatus Matsumura, Thous. Ins. Jap., I, p. 171, pl. XII, fig. 13, ♀ (1904); Matsumura, Syst. Ent. (Konchu bunruigaku), I, p. 190 (1907).

Limnophilus subfuscus Ulmer—Cat. Coll. Zool. Selys, VI (1), p. 20, figs. 32-35 (1907); Ulmer, Deutch. Ent. Zeit., p. 341 (1908).

The *L. subfuscus* described by Ulmer is apparently identical with *L. fuscovittatus*, which was overlooked by him. The original description of this species, which is not a bad one and is accompanied by a figure, cannot be considered unrecognizable, though written in the Japanese language, for the latter is certainly not to be regarded as unintelligible by the workers of the western world. I was therefore compelled to make *subfuscus* a synonym of *fuscovittatus*.

Habitat—Hondo (Tokyo and Gifu).

Time of appearance—October, April—It possibly passes winter in the imago state.

7. *Limnophilus affinis* Curtis.

Limnophilus affinis Curtis, Phil. Mag., IV, p. 123 (1834).

Limnophilus stigmaticus Kolenati var. (?) *affinis* Walker, Cat. Brit. Mus. Neuropt., I, p. 27 (1852).

Limnophilus affinis MacLachlan, Rev. Syn. Trichopt. Europ. Fauna, p. 82, pl. IX, fig. 8 (1875); Matsumura, Thous. Ins. Jap., I, p. 170, pl. XII, fig. 9, ♀ (1904); Matsumura, Journ. Coll. Agr. Tohoku Imp. Univ., IV, p. 16 (1911).

Several specimens from Sapporo (H. Okamoto coll.), Gifu (S. Yamamura coll.), Uwajima, Prov. Iyo (Arakawa coll.) are in my collection. I have compared these with others from Europe (I am indebted to Mr. E. Petersen for several European specimens of this species) without discovering any difference that appears to be specific. The Japanese form is somewhat larger and occasionally has an oblique hyaline band on the disk of the forewing.

Distribution—Japan, Saghalien, Siberia, Europe.

Time of appearance—March and April.

8. *Limnophilus amurensis* Ulmer.

Limnophilus amurensis Ulmer—Stett. Ent. Zeit., Jg. 66, p. 8, taf. I, figs. 4 and 5 (1905); Ulmer, Cat. Coll. Zool. Selys, VI (1), p. 19, figs. 28, 29, taf. I, fig. 5 (1907); Ulmer, Deutch. Ent. Zeit., p. 341 (1908).

Habitat—Hokkaido (Sapporo). Amurland.

Time of appearance—Unknown.

9. *Limnophilus ornatus* Banks (?).

Limnophilus ornatus (?) Ulmer, Cat. Coll. Zool. Selys, VI (1) p. 20, figs. 30, 31, taf. I, fig. 6 (1907); Ulmer, Deutch. Ent. Zeit., ip. 341 (1908), nec Banks.

This species is unknown to me. Ulmer recorded two female specimens from Hokkaido ("Yerse"), saying, "Die beiden Stücke stimmen gut, wie das auch meiner Figur auf Tafel I zeigt, mit der Beschreibung von Banks überein; die Appendices præanales eines amerikanischen Exemplares, das mir von C. Betten gesandt wurde (det. N. Banks) sind allerdings an der Basis etwas breiter und schwach medianwärts statt lateralwärts gekrümmt; . . ."

In any case it is very interesting to know that the same or a very closely allied species occur in such widely separated localities as North America and Hokkaido.

Genus *Nothopsyche* Banks.

10. *Nothopsyche pallipes* Banks.

Nothopsyche pallipes Banks, Proc. Ent. Soc. Wash., VII, p. 107, pl. III, fig. 1 (1906); Ulmer, Cat. Coll. Zool. Selys, VI (1) p. 29, figs. 48, 49 (1907); Ulmer, Deutch. Ent. Zeit., p. 341 (1908).

Habitat—Hondo (Gifu, and Numata, Prov. Kozuke).

Time of appearance—October.

11. *Nothopsyche ruficollis* (Ulmer).

Chilostigma ruficolle Ulmer, Stett. Ent. Zeit., Jg. 66, p. 14, taf. I, figs. 12, 13 (1905).

Nothopsyche ruficolle Banks, Proc. Ent. Soc. Wash., VII, p. 107 (1906).

Nothopsyche ruficollis Ulmer, Cat. Coll. Zool. Selys, VI (1) p. 29, figs. 46, 47 (1907); Ulmer, Deutch. Ent. Zeit., p. 342 (1908).

Habitat—Hondo (Tokyo, Gifu, Numata). Shikoku (Uwajima, Matsayama). Kiushin (Yanagawa, Prov. Chikugo).

Time of appearance—August to November.

12. *Nothopsyche longicornis*, sp. nov.

Head fuscous black; frons with long piceous hairs; maxillary palpus greyish black; antenna black, much longer than fore-wing.

Prothorax dark orange, beset with long fuscous hairs. Meso- and metathorax black or fuscous black. Legs blackish, with many black spines; spurs black.

Fore-wing broad, semi-hyaline, nearly uniformly smoky brown, somewhat suffused with yellowish in basal area; venation fuscous; discal cell very long, twice the length of the first apical cell. Hind-wing similar to the fore-wing, but the basal area not suffused with yellow; colour of the wing lightened in inner marginal area; venation darkish.

Abdomen dark brown, ochraceous toward apex; hind margin of each segment narrowly variegated with dark yellow. In the male the posterior margin of the 9th abdominal segment produced into a quadrangular prolongation in the middle; superior appendage ochraceous, stout, and broad; inferior appendage very long, stout, with the apex furnished with numerous spiny hairs; viewed from above, between the inferior appendages, are seen two slender yellowish processes.

Length of body 5—5.5 mm.; length of fore-wing 9 mm.; length of hind-wing 7 mm.

The type is a single male specimen captured by Mr. S. Yamamura at Minakuchi, Prov. Ohmi, on November 4, 1911.

This species is closely allied to *N. ruficollis*, but can at once be distinguished from the latter by the much smaller size. The structure of the male genitalia and a certain character in wing venation also afford unmistakable distinctive criteria between the two species.

Genus *Moropsyche* Banks.

13. *Moropsyche parvula* Banks.

Moropsyche parvula Banks, Proc. Ent. Soc. Wash., VII, p. 108, pl. III, figs. 3, 8 (1906); Ulmer, Deutch. Ent. Zeit., p. 342 (1908).

This species is unknown to me. I have not yet obtained a specimen, nor have I seen any in Japan.

Habitat—Kiushiu (Hikozan), according to Banks.

Time of appearance—March, according to Banks.